N. A. C. A. BULLETIN

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IN THREE SECTIONS

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Section I

The Administration of Standards and Their Flow Through the Various Accounts

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The Administration of Standards and Their Flow Through the Various Accounts

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EDITORIAL DEPARTMENT NOTE

One of the problems that arises in the proper use of a system of budgetary control is the preparation of satisfactory information so that executives interested in the progress of the business can have some means of comparing actual and budgeted results. Too frequently it is assumed that once a budgetary control system is put in it is a simple job to compare actual with budgets to bring out significant relationships. These relationships are sometimes buried quite deeply beneath the surface that is evident from simple statements of variation. It takes thorough analysis and painstaking study to bring out these relationships and a thorough knowledge of the executive point of view to present them in such a way that they can be studied and some action taken concerning them.

Our paper this time deals with the question of isolating various factors that cause variation and from such isolation to bring out the reason to the variation as applied to all of the separate causes that might arise.

Mr. Goldsborough Robinson, the author of this paper, is a graduate in electrical engineering of the Rose Polytechnic Institute. He served as a Second Lieutenant in the Signal Reserve Corps until the end of the late war. His subsequent practice of electrical engineering was brief and he entered the accounting field in 1920 as a cost accountant and systems designer of the Mengel Body Company of Louisville, Ky. His belief in the need of an engineering point of view in accounting led him to the public accounting field in 1922 as a partner in the firm of Humphrey Robinson & Company, and Bank Examiners for the Louisville Clearing House Association of Louisville, Ky. Since that time, Mr. Robinson has been engaged in designing standard costs and budget systems in a professional capacity. He has been a member of the N. A. C. A. since 1921. He was an organizer and the Vice-President of the Louisville Chapter. His paper was delivered before that chapter in May, 1930.

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THE ADMINISTRATION OF STANDARDS, AND THEIR FLOW THROUGH THE VARIOUS ACCOUNTS

AS I interpret the subject assigned to me, it amounts to a discussion of the principles which underlie the monthly comparison between standard and actual figures. For, in my opinion, the flow of standards through the various accounts is intended to show up the inevitable variations between actual and standard, and the reasons for such variations. It is not my intention to devote the evening to a long-winded exposition of the glory of standard costs and budgetary control in the abstract. I take it for granted that all of you gentlemen who are sacrificing your evening are already sold on the virtues of standard costs and budgets; otherwise you would not be here. You, as forward looking accountants, realize that it is necessary to give your executives something more than past history. And if you are expected to give something more than past history in your accounting reports, it is only natural to assume that your first step forward will be in the direction of budgetary control.

Past sessions have already dealt with the preparation of the budget and the setting of the standards. Therefore, let us come quickly to this matter of subsequent comparison of actual against standard or actual against budget.

At the outset, we may as well make a distinction between standards and budgets. For my own convenience, I define a standard as a figure expressing what *should be;* and a budget as a figure expressing that which probably *will be.* If we look at business from a practical viewpoint, it follows that there may be a considerable amount of difference between what *"should be"* and what "will be". Standards of cost certainly reflect the costs which should be in the future; but it does not necessarily follow that the organization will attain its standards in the coming year, particularly in the early stages of a standard cost installation. Therefore, let us set our standard costs, and, if judgment dictates, add an allowance to the standards to bring them into line with what we really think will happen in the future, and call the results of the calculation "budgets". The budgets of cost and income, when combined into one statement, give an idea of the probable profits to be attained in every month of the budget period.

As each month of the budget period comes to an end, common

sense requires that a rational comparison between actual and budget for that month be made. Since the theory underlying budget variation statements is admittedly difficult, we shall do well to depart from the realm of abstract theory and instead get down to cases. To me, the best method of presentation is a consideration of a typical manufacturing organization, with sample statements, sample figures, and concrete illustrations of the theory involved.

Consider the N. A. C. A. Manufacturing Co., makers of a standardized article having fifty sizes and styles. The Company quotes a list price on each article, selling its jobbers at a discount of 40% and its retailers at a discount of 10%. The accounting personnel of the Company, in collaboration with its sales and production executives, had already made a budget of sales costs and profits, month by month, for the entire calendar year 1930. No accounting difficulties were encountered in making this budget, since, after all, the calculations performed upon the budget figures were no more difficult than the calculations customarily employed in the treatment of actual past figures.

VARIATIONS BETWEEN ACTUAL AND BUDGETED PROFIT, MONTH OF JANUARY, 1930—Schedule 1

	Budget		Actual		Variation
	A	B	C	D	E
Net Sales		30,000		24,000	6,000*
Less Cost of Goods Sold:					
Opening Inventory	23,900		26,028		2,128*
Depreciation	270		280		10*
Insurance	70		83		13*
Taxes	50		45		5
Supervision	510		650		140*
Power	510		406		104
Supplies	490		381		109
Direct Payroll	1,000		830		170
Brass Used	2,000		1,707		293
Steel Used	500		376		124
Grey Iron Castings Used	2,100		1,917		183
Totals	31,400		32,703		
Less Closing Inventory	11,400		13,772		2,372
Cost of Goods Sold		20,000		18,931	
Gross Profit		10,000		5,069	
Less Selling Expense		3,500		2,800	700
Net Profit		6,500		2,269	4,231*

* Decrease of actual under budget.

All of the officials of the N. A. C. A. Co. realized that almost all of the virtue of the budget would be lost unless monthly comparisons of actual and budget were made. The first attempt to compare budget against actual was made for the month of January, 1930, and is shown on Schedule 1, on the preceding page.

If you will refer to Schedule 1, you will see that it is a very simple statement, consisting of a comparison of budget and actual for January. Variations were obtained by subtraction. The budgeted profit for January was $6,500, but the actual profit was only $2,269; the total variation between budgeted and actual profit was $4,231, red, indicating a very unfavorable result.

Column E on Schedule 1 purports to show the analysis of the variations between actual and budget, all of which add up to the final variation figure of $4,231. The sales and production executives of the N. A. C. A. Co., standing somewhat in awe of the reputed complexity of budget variation statements, had previously requested that all of their budget variation statements be prepared in as simple as possible a form. But these same sales and production executives, in reading Schedule 1, displayed a degree of intelligence which, coming from such untutored accounting minds, was surprising. The sales manager denied that he was responsible for a $6,000 loss of potential profits, as was indicated by actual sales of $24,000 against budgeted sales of $30,000. He contended that in failing to sell the budgeted volume of sales, he had lost for the Company only the probable gross profit on the deficiency in sales, and his argument seemed reasonable.

The production manager was amused by the comparison between actual and budgeted production costs. He noted that the variation on most items of production costs was favorable. He knew quite well that his volume of goods produced during January was only about two-thirds of the budgeted volume, and that the alleged favorable performance of his shop was more apparent than real. He also wondered how the comparison between actual and budget would have appeared if the volume of production had been much greater than budget, instead of less. He therefore expressed the opinion that the variation statement might be taken more seriously if some adjustment of the budgets of variable costs were made to compensate for the variation between budgeted and actual volume of production.

Therefore, the sales and production officials, in conference assembled, opined that the variations in Column E on Schedule 1 were about as meaningless as one might expect from an accounting department, and that the statement, as requested, was indeed simple, in every sense of the word.

The comptroller of the Company was somewhat shocked by this denunciation of his maiden effort toward comparing actual with budget. He went into conference with himself for some days, and indulged in some heavy thought. He finally emerged with a statement like Schedule 2, which, happily, provoked the first words of encouragement and compliment that he, a long suffering accountant, had ever received. Schedule 2 showed clearly the reasons why the budgeted profit of $6,500 for January was not attained. It too was a simple statement, compressed upon one sheet of letter paper, but it showed the real reasons for the loss of $4,231 worth of potential profit. The variation due to volume of sales stated merely the lost gross profit and destroyed the sales

VARIATIONS BETWEEN ACTUAL AND BUDGETED PROFIT, MONTH OF JANUARY, 1930—Schedule 2

Variation Due to		
Volume of Sales		$1,000*
Sales Variety		790
Jobber-Retailer Proportions		2,100*
Selling Prices		900*
Unit Costs of Goods Sold:		
Depreciation	$ 10*	
Insurance	13*	
Taxes	5	
Supervision	140*	
Volume of Productions	270*	
Power	49*	
Supplies	38*	
Direct Payroll	130*	
Brass Used	207*	
Steel Used	24	
Grey Iron Castings Used	217*	
Opening Inventory	1,928*	
Closing Inventory	1,252	
Total Variations in Factory Costs		1,721*
Selling Expense		700
Total Variations		4,231*
Budgeted Net Profit		6,500
Actual Net Profit		$2,269*

* Indicates decrease of actual under budget.

manager's previous objection. The variation due to sales variety, being favorable, indicated that the sales had contained a larger proportion of the long profit sizes and styles than had been contemplated in the original sales budget. The variation due to jobber-retailer proportions showed clearly that sales effort had been directed too much to the jobber market with its 40% discount from list. While it was true that the Company had minimized its salesmen's calls, and had thereby accomplished a $700 favorable variation in its total selling expense, the $2,100 loss of income loomed large beside the $700 saving in selling expense.

The $900 variation due to selling prices was caused by friendly concessions extended to certain favored customers. Consequent to the President's caustic remarks concerning this $900 loss, the sales manager resolved that the Company's much vaunted "one price to all" policy should hereafter become a fact rather than a fable.

The variations shown by Schedule 2 with reference to the unit costs of goods sold were not so amusing to the production manager. Upon inquiry, he found that the original budgets for various production costs had properly been revised downward, because the actual volume of goods produced was less than the budgeted volume.

The message conveyed by Schedule 2 was short and to the point, and left no room for argument. A reading of it rendered the various operating executives sadder but wiser men. The imposing array of red figures on Schedule 2, for the month of January impressed upon each operating executive a healthy attitude of humility and each one filed away the statement with a wholsome intention to reform. The numerous violations of the budget had provoked so many withering and personal remarks from the President himself, that each operating executive became convinced that Hell hath no fury like a budget scorned. Time and space do not permit our consideration of the subsequent issues of Schedule 2 for February, March and April; suffice to say that the lesson taught by the January issue had its effect, and that the inexcusable preponderence of red was never again repeated.

The variation statement of Schedule 2 was not worked out after a few minutes' study. Such a set of variation figures cannot be worked out without a clear understanding of certain underlying principles of standard costs and budgetary control.

WORK SHEET, VARIATIONS IN FACTORY COSTS, MONTH OF JANUARY, 1930—Schedule 3

		Unit of Measure	Budgeted Unit Cost	Budgeted Production At Budgeted Unit Quantity	Budgeted Production At Budgeted Cost Amt.	Actual Production At Budgeted Unit Quantity	Actual Production At Budgeted Cost Amt.	Actual Cost	Variation	Explanation of Variation
		A	B	C	D	E	F	G	H	J
Fixed Burden:										
Depreciation	1	Direct Payroll	$ .27	1,000	$ 270			$ 280	10*	D 1-G 1
Insurance	2	Direct Payroll	.07	1,000	70			83	13*	D 2-G 2
Taxes	3	Direct Payroll	.05	1,000	50			45	5	D 3-G 3
Supervision	4	Direct Payroll	.51	1,000	510			650	140*	D 4-G 4
Total Fixed Burden	5	Direct Payroll	.90		900			1,058	158*	D 5-G 5
Variation due to Volume of Production	6								270*	F 7-D 7
Total Fixed Burden	7	Direct Payroll	.90	1,000	900	700	$ 630	1,058	428*	F 7-G 7
Variable Burden:										
Power	8	Direct Payroll	.51	1,000	510	700	357	406	49*	F 8-G 8
Supplies	9	Direct Payroll	.49	1,000	490	700	343	381	38*	F 9-G 9
Total Burden	10	Direct Payroll	1.90	1,000	1,900	700	1,330	1,845	515*	F10-G10
Direct Payroll	11				1,000		700	830	130*	F11-G11
Direct Materials:										
Brass Used	12				2,000		1,500	1,707	207*	F12-G12
Steel Used	13				500		400	376	24	F13-G13
Grey Iron Castings Used	14				2,100		1,700	1,917	217*	F14-G14
Total Cost of Units Produced	15				7,500		5,630	6,675	1,045*	F15-G15
Opening Inventory	16				23,900		24,100	26,028	1,928*	F16-G16
Total Inventory Debits	17				31,400		29,730	32,703	2,973*	F17-G17
Ratio to F17							100%	110%		
Less Closing Inventory	18				11,400*		12,520*	13,772*	1,253	F18-G18
Cost of Units Sold	19				20,000		17,210	18,931	1,721*	F19-G19

Schedule 3 shows how all of the variations in factory costs were computed. The standard cost of each article manufactured by the Company was expressed in terms of factory burden, direct payroll, brass, steel, and gray iron castings. All standard costs used in the preparation of the budget had been adjusted to conform to current variations in the market prices of raw materials, and a certain amount of inefficiency which was expected in the shop because of the youth of the system. Since the shop was small, burden was applied as a uniform percent of direct payroll.

On Schedule 3, Columns B, C and D relate to the original budget for the month of January. The amounts in Column D for direct pay roll and direct materials were obtained by multiplying the budgeted quantities of each article to be produced in January by the respective budgeted unit costs for each article. The amounts in Column D for the various items of factory burden were each divided by the budgeted amount of direct pay roll. The results were set down in Column B, and show that the total factory burden was budgeted to be $1.90 for each dollar of budgeted direct pay roll, and was divided among the various elements of factory burden in the manner shown in Column B.

After the month of January had elapsed, the actual quantities of each article produced during January were multiplied by the budgeted unit costs, and the resulting figures of direct pay roll and direct materials were entered in Column F. Column F represents, for January, the actual production at budgeted unit costs. Column F differs from the original figures in Column D because the actual volume of production for January was less than the budgeted volume of production. If direct labor can be taken as a rough measure of production volume, then the statement indicates that actual production for January was only about 70% of the budgeted volume, as was contended by the production manager.

Depreciation, insurance, taxes and supervision are treated as fixed charges, which are not expected to vary up and down in proportion to the volume of production. It does not follow that these fixed charges should be 30% less than budget because the production was 30% less than budget. Therefore, the only fair comparisons to be made in the case of these fixed charges are obtained by subtraction of Column G from Column D.

All of the other items of factory cost, from power to gray iron

castings, are considered as variables, and are expected to vary up and down in direct proportion to the volume of production. In the case of all such variable production costs, the comparison between actual and budget must be made by subtracting Column G from Column F, not from Column D. The principal fallacy in Schedule 1, the first variation statement submitted, was due to the fact that it compared Column G with Column D, taking no account of the fact that volume of production was much less than that budgeted.

Return for a moment to the variations in the fixed charges, depreciation, etc. Surely we must grant the logic of showing variations in these items by subtracting Column G from Column D, or by comparing the actual costs with the original predetermined budget for January. But let me remind you that every production variation statement must finally boil down to a comparison between actual and actual production at budgeted unit costs, not between actual and original budget. Therefore, we must compute actual production at budgeted unit costs even for the fixed burden. This we do on line 7, multiplying $700 by $.90, and setting down $630 as Item F7. The total variation in the fixed burden is really $630, Item F7, minus $1,058, Item G7, or $428 red. This total variation is then split into two parts, $158, Item H5, and $270, Item H6.

We all know that fixed charges may increase in effect for two entirely different reasons, namely:

(a) Due to increase in fixed expenditures.
(b) Due to decrease in volume of production.

Now the variation in the fixed expenditures is all shown as $158, Item H5. It therefore follows that the $270 variation, Item H6, represents the loss suffered by the Company due to lack of volume of production. It is nothing more than our old friend, "unabsorbed burden". If it had happened that volume of production in January had been greater than budgeted volume, then the $270 red variation, Item H6, would have become a black figure, representing the burden over-absorbed by reason of production volume being greater than budget.

On Line 15, the total cost of units produced during January is expressed in terms of budgeted unit costs and actual unit costs in Columns F and G respectively. To Line 15 is added the opening

inventory of work-in-process and finished goods on Line 16, resulting in the total inventory debits for the month shown on Line 17. The total inventory debits are likewise expressed in terms of budgeted unit costs and actual unit costs in Columns F and G respectively.

Item F 19 represents the actual units of each article shipped, multiplied by its respective budget unit cost. Subtraction of the actual units sold at budgeted unit costs from Item F 17 determines the closing inventory at budgeted unit costs, Item F 18.

But the actual cost values of the shipments and of the closing inventory as shown in Items G 18 and G 19 have not yet been determined. But, the ratio of actual to budget for the total inventory debits as obtained by dividing Item G 17 by F 17, is 110%. If we then multiply Items F 18 and F 19 by 110%, we obtain fairly reasonable valuations of the closing inventory and shipments at actual cost, and set the figures down as Items G 18 and G 19.

In reading Schedule 3, it is to be noted that Item H 16, $1,928 red, represents the variation carried forward in the opening inventory. This variation is an inheritance from past months. Similarly, Item H 18, $1,252 black, represents the variation from budget in the closing inventory. It constitutes a variation favorable to the month of January, but will constitute a variation unfavorable to the month of February.

Item H 19, $1,721 red, represents the final variation in the profits of the Company for January due to the unit costs of the goods shipped. The explanation of Schedule 4, which follows, will show how this variation in cost of goods sold $1,721 red, is merged with other variations in order to explain the total variation in net profit for the month.

Please refer now to Schedule 4. It shows how the variations due to volume of sales, sales variety, etc., were computed. It effects a complete reconcilement betwen the budgeted profit for the month of $6,500 and the actual profit of $2,269.

On Schedule 4, Lines 1 to 3 inclusive show the original budget for January in detail. Note that the trade discounts to jobbers and retailers, respectively, were budgeted at 40% and 10% of the list sales to each market. It is obvious that the discrepancy be-

WORK SHEET, VARIATIONS IN PROFIT, MONTH OF JANUARY, 1930—Schedule 4

		Sales at List A	Trade Discounts B	Net Sales C	Cost of Goods Sold D	Gross Profit E	Selling Expense F	Net Profit G
Budgeted Sales to Jobbers	1	20,000	8,000	12,000				
Budgeted Sales to Retailers	2	20,000	2,000	18,000				
Total Budget	3	40,000	10,000	30,000	20,000	10,000	3,500	6,500
Variation Due to Volume of Sales	4					1,000*		
Actual Units Sold at Budgeted List Prices, Budgeted Discount, and Budgeted Percent of Gross Profit	5	36,000	9,000	27,000		9,000		
Variation Due to Sales Variety	6					790		
Actual Units Sold at Budgeted List Prices, Budgeted Discount, and Budgeted Unit Costs	7	36,000	9,000	27,000	17,210	9,790		
Variation Due to Jobber-Retailer Proportions	8					2,100*		
Actual Units Sold at Budgeted List Prices, Budgeted Discounts—								
To Jobbers	9	25,000	10,000					
To Retailers	10	11,000	1,100					
and Budgeted Unit Costs	11	36,000	11,100	24,900	17,210	7,690		
Variation Due to Selling Prices	12					900*		
Actual Units Sold at Actual List Prices, Actual Discounts, and Budgeted Unit Costs	13			24,000	17,210	6,790		
Variation Due to Unit Costs of Goods Sold	14					1,721*		
Actual Units Sold at Actual List Prices, Actual Discounts, and Actual Unit Costs	15			24,000	18,931	5,069		
Variation in Selling Expense	16						700	
Actual Operations for Month	17			24,000	18,931	5,069	2,800	2,269

* Decrease of actual under budget.

tween budgeted net profit and actual net profit is due to the combined effects of a number of different causes. The variations due to volume of sales, sales variety, jobber-retailer proportions, etc., may be thought of as a number of malignant germs bent on destroying the health of the Company. It is therefore up to you cost accountants, you business doctors, to isolate these various germs one from the other, before you can decide what kind of medicine to prescribe for this sick business.

The total variation in profit for the month of $4,231, red, can best be sifted down into its various causes by assuming that only one of the causes of variation exists at a time, and calculating the effect upon profits due to that class of variation, and then proceeding to the next class of variation. The procedure, difficult for me to describe in words, may be understood by reference to the figures on Schedule 4.

Line 5 shows the actual units sold at budgeted list prices, budgeted discount, and budgeted per cent of gross profit. The budgeted discount was 25% of total sales at list, and the budgeted per cent of gross profit was 33 1/3% of net sales.

Now the only difference between Line 3 and Line 5 is in the quantity of units sold. Line 3 is based upon the budget units sold. Line 5 is based upon the actual units sold. In other respects, the figures appearing on Lines 3 and 5 are exactly alike. In Line 5, we have assumed that nothing has varied from the original budget except the volume of units sold. Therefore, Item E 4, $1,000 red, which is the difference between Items E 3 and E 5, can be due to nothing but the volume or quantity of units sold. In Line 5, we assumed that only one of the malignant germs was at work upon the operations of the Company, and calculated the damage thereby perpetrated as $1,000, Item E 4.

Next, on Line 7, we computed the actual units sold at budgeted list prices, budgeted discount and budgeted unit costs. Line 7 differs from Line 5 only in that the gross profit is computed on the basis of the budgeted unit costs of the styles and sizes actually shipped instead of on the basis of the per cent of gross profit, 33 1/3%, originally contemplated by the budget. Therefore, the difference between Line 5 and Line 7 as shown by Item E 6, can be due only to the fact that the make-up of the January sales, as

to styles and sizes, was different from the make-up of sales originally contemplated by the budget.

On Line 11 we compute the actual units sold at budgeted list prices, budgeted discounts and budgeted unit costs. Note that the budgeted discounts are applied separately to the list sales to jobbers and retailers, instead of being applied to the list sales as a whole. Therefore, the difference between Line 11 and Line 7 must be due to an upset condition in the proportions between jobber and retailer list sales.

On Line 13 is shown the actual units sold at actual list prices, actual discounts and budgeted unit costs. The difference between Line 13 and Line 11, as shown by Line 12, must be due solely to variations between the actual net selling prices obtained in January and the net selling prices contemplated by the budget.

On Line 15 is shown the actual units sold at actual list prices, actual discounts and actual unit costs. In other words, Line 15 shows the actual gross profit attained in January. The difference between Line 15 and Line 13, as shown on Line 14, is due entirely to the difference between the actual unit costs and the budgeted unit costs applicable to the goods sold in January. Item E 14, $1,721 red, agrees with the total variation figure previously computed on Schedule 3.

Line 16 shows the variation in total selling expense for the month, and is obtained by subtraction of Item F 17 from F 3. This variation of $700 may be further analyzed by simple comparison of the budgeted and actual details of selling expense for the month.

Line 17 ends the story, since it shows the final, actual statement of operations for January. Thus, by considering that only one cause of variation operates at a time, and by successive computations of profit, we have finally sifted the total variation in profit, $4,231 red, into its various causes, and isolated the various germs as was desired.

The foregoing paper naturally cannot explain all of the theory of variations from budget. A really exhaustive treatment of the subject is at the command of all of you, if you will refer to the writings of Mr. Charter Harrison, but I believe that we have cov-

ered the basic principles of the subject at least. Perhaps the principles which have been described seem complicated at first examination; but remember that the complexities and difficulties usually disappear after the first month of operation of a system such as has been described. The initial design of such a system is difficult; but after the design has been completed, it can be presented in such a cut and dried form to the man who operates it, that the various variations can be developed each month with an astounding rapidity and ease. Don't get the idea that the first hundred years of budgetary control are the hardest; rather I should say that the first thirty days are the hardest, and that subsequent preparation of the variation statements becomes fairly easy.

These principles of variation analysis may be applied to any company, however small, without inviting the charge of over-accounting. In small companies the cost of operating such a system may be held down to a reasonable figure by perhaps eliminating a report on some of the less important causes of variations, and above all, by a thorough and painstaking design of the system before its installation.

In my opinion, the above examples illustrate the necessary flow of standards through the various accounts. I do not advocate the recording of standards and budgets on the general ledger, believing that comparison with actual can best be made by the use of work sheets.

I hope that the above paragraphs may clear up some of the difficulties which you may have experienced in your consideration of comparisons between actual and standard; and that you will be convinced that standard costs and variations hold no terrors for any man who is patient enough to study and think.

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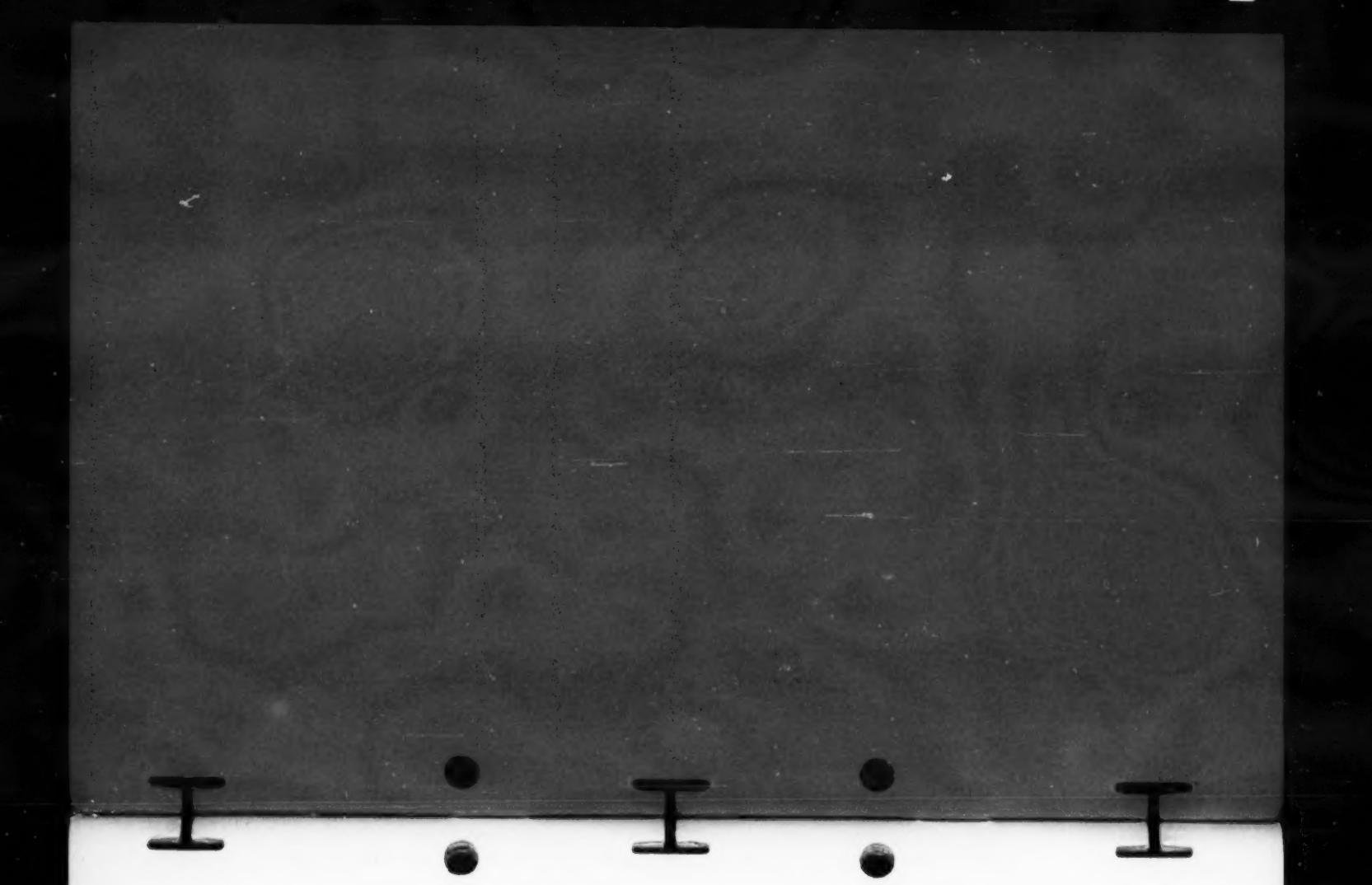

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